

**SCRUB SEAL MSP-98-07D**

1.0 Description. This specification covers the materials and construction requirements for producing and placing a polymer modified asphalt (scrub seal) emulsion intended for use as a surface rejuvenation treatment to fill and seal cracks.

2.0 Materials.

2.1 Scrub Seal Emulsion. Scrub seal emulsion shall meet applicable requirements of Sec 1015 except as modified herein. It shall be smooth and homogeneous, be polymer modified, contain an asphalt rejuvenator and shall comply with the following requirements:

Tests on Scrub Seal Emulsion	Min.	Max.	Test Method
Saybolt Furol Viscosity, SFS @ 25 °C	30	100	ASTM D244
Storage Stability Test ^(a) , 24 hr., %	--	1	ASTM D244
Demulsibility, 35 ml of 0.02N, CACl ₂ , %	--	60	ASTM D244
Sieve Test ^(b) , %	--	0.1	ASTM D244
Residue by Distillation ^(c) @ 205 °C, %	60	--	ASTM D244
Oil Distillate by Volume, %	--	3	ASTM D244

Tests on Residue from Distillation	Min.	Max.	Test Method
Penetration @ 25 °C, 5 sec, 100 g, dmm	100	300	ASTM D5
Float Test @ 60 °C, sec	1200	--	ASTM D139
Ash, %	--	1	AASHTO T111
Elastic Recovery, 10 °C, 200 mm elongation, 60 min. recovery, %	30	--	ASTM D5976
Saturates ^(d) , %	--	20	ASTM D4124

(a) Upon examination of the test cylinder after standing undisturbed for 24 hours, the surface shall show no white, milky colored substance but shall be a homogeneous brown color throughout.

(b) A percentage of 0.30 is acceptable for samples taken at the point of use or shipped to the Central Laboratory for testing.

(c) ASTM D244 with modifications to include 205 ± 5 C maximum temperature to be held for 15 minutes.

(d) ASTM D4124 with modification to use Alumina, CG - 20 Grade, available from Aluminum Company of America, Pittsburgh, PA.

2.2 Mineral Aggregate. The mineral aggregate shall conform to Sec 1005.2, except that manufactured sand shall not be used. Aggregate substitutions, such as wet bottom boiler slag, may be allowed as approved by the engineer.

2.3 Special Additives. These additives are any other materials that are added to the mixture or to any of the component materials to provide the required properties. All additives shall be supplied by the emulsion manufacturer.

2.4 Material Acceptance. Prior to beginning any work, the scrub seal emulsion manufacturer

shall supply a set of certified test results for the material being supplied, indicating compliance with all specified material properties. Furthermore, for each load of scrub seal emulsion the manufacturer shall furnish a certification stating that the emulsion and any special additives are the same as those which were prequalified and that all materials meet the specifications. At least one sample of emulsion ~~shall~~will be taken by the inspector during the project and submitted to the Central Laboratory for confirmation purposes.

2.4.1 All aggregates ~~shall~~will be sampled, tested and approved by the engineer, prior to use.

2.4.2 Water shall be potable and approved by the Missouri Department of Natural Resources.

3.0 Equipment.

3.1 Aggregate Spreader. The self-propelled aggregate spreader shall be capable of evenly spreading aggregate in a width of 8 to 14 feet at a minimum rate of 12 pounds per square yard (2.4 to 4.2 m at a minimum rate of 6.5 kg per square meter). Motor graders and trucks are not acceptable spreaders.

3.2 The pneumatic tire roller shall meet the requirements of Sec 403.12 with a 5 ton weight (4.5 Mg mass).

3.3 The brooms used in the scrub seal process shall be constructed to meet the nominal dimensions in figure 1, using the following bill of materials. The final assembly shall be constructed with the nominal dimensions and the arrangement shown in the figure 1.

Qty.	Nominal Dimension	Qty.	Dimension
2	2x6x7 ft (50x150x2130 mm) wood member	112	3/16 in (4.76 mm) nuts
	2x6x8 ft (50x150x2440 mm) wood member	112	3/16 in (4.76 mm) flat washers
2	2x6x12 ft (50x150x3660 mm) wood member	112	3/16 in (4.76 mm) lock washers
2	(50x150x4270 mm) wood member	112	3/16 x 5 in (4.76 x 127 mm)
			carriage bolts
35	Street brooms with nylon bristles (3-1/2 in W x 6 in H x 16 in L) (90mm W x 150mm H x 405mm L)	2	3/8 in x 2 ft (9.53 mm x 610 mm)
			chain with hooks (minimum)
	Weights as determined by the engineer	2	3/8 x 6 in (9.53mm x 152.4 mm)
			bolts with nuts, locks and washers

4.0 Construction Requirements.

4.1 Surface Preparation. Immediately prior to applying the scrub seal emulsion, the surface shall be thoroughly cleaned of all vegetation, loose materials, dirt, mud, and other objectionable materials.

4.2 Application. Scrub seal emulsion shall be applied uniformly with a pressure distributor at the rate specified in the contract, or as revised by the engineer. The mixture shall be spread to fill cracks and minor surface irregularities and leave a uniform surface.

4.3 Physical Characteristics for Scrub Seal.

Properties	Minimum	Maximum
Application rate of emulsion, gallons/sq.yard	0.14 (0.63)	0.18 (0.82)
(liters/sq.meter) ^(e)		
Emulsion Temperature, °F (C°)	110 (44)	160 (71)
Application rate of aggregate, pounds/sq.yard	12 (6.5)	15 (8.1)
(kg/sq.meter) ^(e)		
Pavement Temperature, °F (C°)	70 (21)	90 (32)
Time of set prior to opening, hours (f)	2	- -
Number of roller passes	2	- -

4.4 Method of Placement. After proper surface preparation, a distributor truck shall place the scrub seal emulsion at the prescribed rate. The distributor truck shall pull the broom assembly to sweep and spread the emulsion uniformly on the surface and into the cracks of the pavement.

4.4.1 Fine aggregate shall be placed immediately after the application of the emulsion by a self-propelled aggregate spreader. Immediately following the aggregate spreader shall be a truck pulling a second broom assembly to combine the aggregate with the emulsion.

4.4.2 The pneumatic tire roller shall immediately follow the second broom and make a minimum of 2 passes.

4.5 Weather Limitations. The scrub seal emulsion shall not be placed when any of the following conditions exist: (1) the temperature of the surface on which the mixture is to be placed is below 70 °F or above 90 °F (21 °C or above 32 °C), (2) on any wet surface, (3) local weather forecasts predict rain or air temperatures below 60°F (16 °C) within the next 72 hours, or (4) weather conditions prevent the proper handling or finishing of the mixture. (Temperatures shall be obtained in accordance with MoDOT Test Method T 20.)

4.6 Any traffic damaged or marred areas shall be repaired by the contractor at no additional charge.

5.0 Method of Measurement. Measurement of scrub seal emulsion and mineral aggregate complete in place, including any multiple passes or courses, will be made to the nearest square yard (square meter). Measurement of individual passes or courses will not be made. Final measurement of the completed surface will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

6.0 Basis of Payment. The accepted quantity of scrub seal in place will be paid for at the contract unit price, per square yard (square meter).

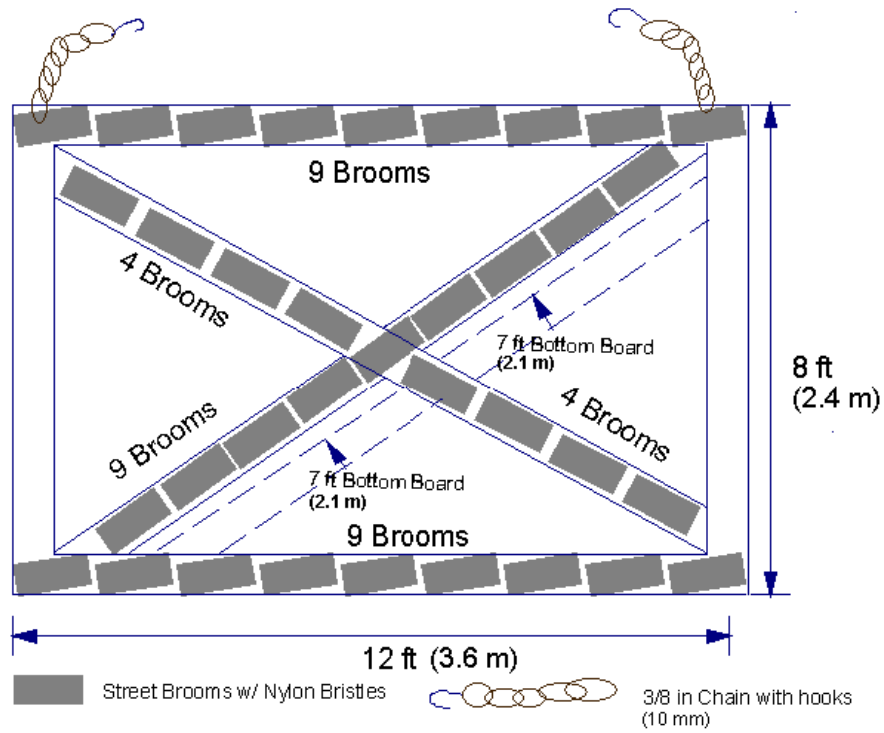


Figure 1